FEDERAL - STATE COOPERATIVE

SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

Platte and Arkansas Drainage Basins

By

Division of Irrigation, Soil Conservation Service
United States Department of Agriculture
and
Colorado Agricultural Experiment Station

Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado, Wyoming and New Mexico and other Federal, State and local organizations.

As of

MAR. 1, 1951

FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION
WATER SUPPLY FORECASTS

FOR

PLATTE-ARKANSAS RIVER BASINS

Report Prepared

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Miscellaneous Series Paper No. 486
Colorado Agricultural Experiment Station

WATER SUPPLY OUTLOOK
PLATTE-ARKANSAS DRAINAGE BASIN

March 1, 1951

Snow accumulation to March 1 was above normal on these watersheds except for the southern tributaries to the Arkansas. On the South Platte and its tributaries snow cover is well above normal for this date. Snow cover on the headwaters of the North Platte is slightly above normal. Precipitation in valley areas has been deficient for several months and soil moisture conditions are fair to poor in most areas. Stream flow is generally below normal. Storage in most reservoirs used for irrigation purposes is much below last year and the past ten-year average.

CHEYENNE RIVER

The water supply outlook for the irrigated areas near the Black Hills in South Dakota is not favorable at this time. Snow cover is much below normal in the mountains. Precipitation has been deficient for several months and soil is reported as extremely dry. Stream flow is below normal and very little runoff may be anticipated from the present snow cover. Storage in Belle Fourche reservoir is now 81,000 acre-feet as compared to 70,000 on March 1, 1950.

NORTH PLATTE RIVER

On the mountains southwest of Lander on the Sweetwater River the snow accumulation to date is 120 percent of normal. Similar conditions exist on the North Platte in Wyoming and in North Park in Colorado. Snow cover on Snowy Range and in the Rabbit Ears Pass area is well above normal. Elsewhere the snow cover on the upper North Platte is normal or slightly below normal. In the valley areas of eastern Wyoming and western Nebraska soil moisture conditions are reported as dry. There is some snow in North Park but there is very little snow in the upper valleys in Wyoming. Stream flow is reported as about normal. Adequate irrigation water supplies are assured below the major reservoirs in Wyoming because of heavy runoff in the 1949 snow-melt season. Total storage in these four reservoirs is now 1,650,000 acre-feet which is exactly the same as for March 1, 1950. This is near three times the past ten-year average. Storage in Kingsley and Sutherland reservoirs is about 10 percent above last year with a total of about 1,869,000 acre-feet.

On the Laramie River the snow cover is somewhat above the North Platte, about 140 percent of normal. The snow cover is particularly heavy on the Little Laramie. Soil moisture conditions in the Laramie and Wheatland areas are reported as very dry. There is very little snow at valley elevations at this time. Storage in Wheatland reservoirs is now 39,400 acre-feet as compared to 45,900 a year ago.

WATER SUPPLY OUTLOOK
PLATTE-ARKANSAS DRAINAGE BASIN

MARCH 1, 1952

Snow accumulation to March 1 was above normal on these watersheds except for the southern tributaries to the Arkansas. On the South Platte and its tributaries snow cover is well above normal for this date. Snow cover on the headwaters of the North Platte is slightly above normal. Precipitation in valley areas has been deficient for several months and soil moisture conditions are fair to poor in most areas. Stream flow is generally below normal. Storage in most reservoirs used for irrigation purposes is much below last year and the past ten-year average.

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On the Laramie River the snow cover is somewhat above the North Platte, about 110 percent of normal. The snow cover is particularly heavy on the Little Laramie. Soil moisture conditions in the Laramie and Wheatland areas are reported as very dry. There is very little snow at valley elevations at this time. Storage in Wheatland reservoirs is now 29,100 acre-feet as compared to 15,900 a year ago.

SOUTH PLATTE RIVER

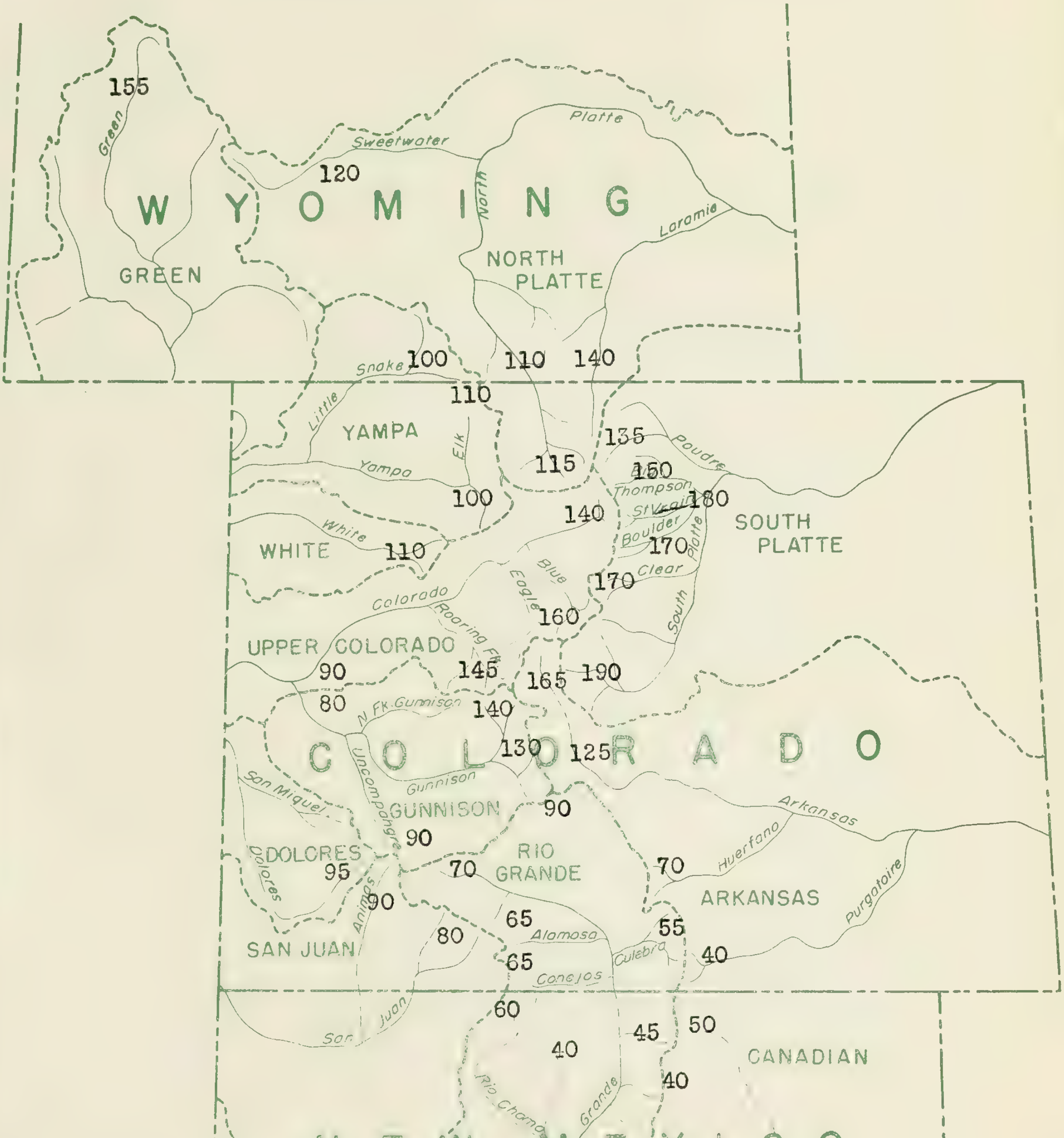
The irrigation water supply outlook for the South Platte and its tributaries is favorable as of this date. The snow cover is well above normal on all tributaries but there is very little carry-over reservoir storage. In order to have a good water year, a normal snow accumulation during the spring months will be required. In respect to percent of normal the snow cover on the South Platte tributaries is as follows: Poudre 135, Big Thompson 150, Saint Vrain 180, Boulder 170, Clear Creek 170 and the South Platte above Denver 190. The snow cover at medium mountain elevation is near twice normal which should provide early runoff to make up some of the deficiency in reservoir storage. Storage in the irrigation reservoirs is below normal and considerably below last year. Stream flow is reported as below average. Valley precipitation during the past season has been generally deficient. February precipitation has improved top-soil moisture near the mountains but the soil continues dry in eastern Colorado.

ARKANSAS RIVER

There is a wide variation in snow cover on the Arkansas watershed as of this date. On the upper Arkansas near Leadville the snow cover is 165 percent of the March 1 normal. Near Monarch Pass it is about 125 percent. On the headwaters of the Huerfano, Cucharas and Purgatoire Rivers in the Sangre de Cristo Range a definite deficiency in snow cover exists. Unless the snow accumulation during the next two months is unusually high the summer flow will be near a minimum of record. Stream flow is reported as below average. Soil moisture conditions are described as very dry. Except for Twin Buttes reservoir in the extreme southeast part of the state, carryover storage of irrigation water is low. The general outlook for water supply from the Arkansas River is that the summer flow will be slightly above average and considerably better than last year. The outlook for tributary streams is for extremely deficient summer flow.

WATER CONTENT OF SNOW ON THE WATERSHEDS OF PLATTE, ARKANSAS, UPPER COLORADO AND RIO GRANDE BASINS BASED ON SNOW SURVEYS MADE APPROXIMATELY FIRST DAY OF MONTH

In Percent of Normal
March 1, 1951



STATUS OF RESERVOIR STORAGE, PLATTE-ARKANSAS BASIN, March 1, 1951

BASIN AND STREAM	RESERVOIR	USABLE CAPACITY (Thous. A.F.)	THOUSANDS ACRE FEET IN STORAGE About March 1, 1951				
			1951	1950	1949	1948	10-year Avg. 1941-1950
MISSOURI RIVER							
Poudre River	Windsor	18.6	5.9	11.7	3.6	12.5	9.9
" "	Cache la Poudre	9.5	5.6	7.6	2.8	9.2	6.4
" "	Fossil Creek	11.6	6.4	7.3	4.3	10.1	6.6
" "	Terry Lake	8.2	4.1	4.2	2.7	4.4	4.2
" "	Halligan	6.4	0.0	0.0	1.3	0.0	1.1
" "	Chamber's Lake	8.8	1.7	2.0	1.3	2.7	2.2
" "	Cobb Lake	34.3	5.0	11.3	3.9	5.4	5.4
" "	Black Hollow	8.0	0.7	5.1	2.2	4.3	3.5
Big Thompson River	Lake Loveland	14.3	3.2	5.6	1.5	6.5	4.2
" " "	Boyd Lake	44.0	16.0	26.4	20.5	30.1	18.7
" " "	Lone Tree	9.2	7.2	5.4	3.3	8.0	5.2
" " "	Mariano	5.4	0.2	1.7	0.9	4.0	1.9
St. Vrain River	Union	12.7	3.4	9.0	6.1	10.6	7.0
South Platte River	Eleven Mile	81.9	72.0	81.9	81.9	81.9	81.8
" " "	Cheeseman	79.0	25.7	64.2	48.6	77.3	61.9
" " "	Marston	18.9	9.1	12.2	13.4	14.0	15.2
" " "	Barr Lake	32.2	14.5	25.2	26.2	25.9	20.8
" " "	Milton	24.4	5.2	15.7	12.2	17.1	11.9
" " "	Standley	18.5	6.9	9.2	10.4	14.6	11.1
" " "	Marshall	10.3	1.4	1.5	0.7	2.6	2.2
" " "	Antero	33.0	19.8	21.0	19.8	21.0	15.8
" " "	Horse Creek	20.6	6.5	12.0	12.4	14.7	10.3
" " "	Riverside	57.5		57.9	34.4	53.9	44.8
" " "	Empire	37.7		32.8	32.2	30.4	29.6
" " "	Jackson Lake	35.4		33.8	23.7	31.2	30.6
" " "	Prewitt	32.8	17.8	30.0	21.2	26.9	22.3
" " "	Point of Rocks	70.0	46.6	69.8	29.9	67.8	53.9
" " "	Julesburg	28.2	20.1	20.1	19.8	20.3	20.3

RESERVOIR STORAGE, Cont.

BASIN AND STREAM	RESERVOIR	USABLE CAPACITY (Thous. A.F.)	THOUSANDS ACRE FEET IN STORAGE ABOUT MARCH 1				
			1951	1950	1949	1948	10-year Avg.* 1941-1950
North Platte River	Kingsley	1996.0	1823.0	1738.0	1629.8	1567.4	991.8
" " "	Sutherland	185.0	46.0	55.3	41.7	61.1	50.1
" " "	Minatare	60.8	29.0	24.9	18.2	21.6	19.9
" " "	Alcova	190.0	169.9	154.9	129.5	109.6	72.3
" " "	Seminoe	1025.0	562.9	604.0	547.7	631.4	333.6
" " "	Guernsey	46.0	36.8	47.2	19.6	44.5	38.0
" " "	Pathfinder	1045.5	889.6	846.1	459.8	518.6	369.7
Laramie River	Wheatland	70.4	39.4	45.8	32.8	69.8	33.3
ARKANSAS RIVER							
Arkansas River	Twin Lakes	57.9	11.0	22.9	22.9	37.5	28.1
" "	Sugar Loaf	17.4	5.1	6.5	7.6	10.6	8.9
" "	Clear Creek	11.4	0.6	6.8	7.4	9.4	6.5
" "	Meredith	41.9	0.0	6.2	21.8	32.6	25.0
" "	Horse Creek	26.9	0.0	7.0	15.6	16.8	12.4
" "	Adobe Creek	61.6	0.0	29.5	30.2	55.0	37.5
" "	Cucharas	40.0	2.2	4.1	8.6	18.4	8.0
" "	Two Buttes	40.9	33.0	21.8	10.0	—	6.9
" "	John Martin	655.0	79.1	155.3	138.0	59.6	70.8*
" "	Great Plains	150.0	46.3	72.0	100.1	111.3	71.1
Purgatoire River	Model	15.0	0.6	0.9	1.6	3.5	4.0
CHEYENNE RIVER							
Belle Fourche River	Belle Fourche	198.1	81.4	69.8	122.5	149.8	115.0
Cheyenne	Angostura	160.0	28.5	—	—	—	—

*Some for shorter periods

SUMMARY OF MARCH 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

PLATTE-ARKANSAS DRAINAGE BASINS

WATERSHEDS	Y Snow Depth			Water Content			Number Courses in Average	Snow Density			1951 Water Content in percent of	
	Fourteen Year Avg.*	1950	1951	Fourteen Year Avg.*	1950	1951		Fourteen Year Avg.*	1950	1951	Fourteen year Avg.*	1950
CHEYENNE RIVER	In.	In.	In.	In.	In.	In.		Percent	Percent	Percent		
Cheyenne River	21.3	14.6	10.7	4.7	3.0	2.4	3	22	21	22	48	75
PLATTE RIVER												
Sweetwater	39.9	53.3	47.3	10.8	17.4	14.2	2	27	33	30	131	82
North Platte River	50.4	50.2	50.0	14.7	15.4	16.1	10	29	31	32	110	105
Laramie River	36.1	33.8	43.6	9.9	10.0	13.7	7	27	30	31	139	137
South Platte River**	22.9	23.4	37.1	4.9	4.1	9.3	3	21	18	25	190	226
Crow Creek	17.3	10.4	11.2	4.1	2.3	2.6	1	24	22	23	63	113
Poudre River	34.4	33.2	42.4	9.4	9.4	12.9	6	27	28	30	137	137
Big Thompson River	47.4	46.1	58.0	12.6	12.8	19.0	2	27	28	33	151	148
St. Vrain River	37.9	39.0	54.1	9.7	11.0	18.2	1	26	28	34	188	165
Boulder Creek	31.0	28.8	47.2	9.4	6.9	16.1	2	30	24	34	171	234
Clear Creek	43.1	41.4	60.6	11.5	10.2	19.8	2	27	25	33	172	194
ARKANSAS RIVER	33.3	27.6	38.9	8.2	6.6	10.5	9	25	24	27	128	159

*Some for shorter periods. **Above Denver

PRECIPITATION DATA*

March 1, 1951

WATERSHED	STATE	Precipitation October 1 to February 28	Departure from Normal	Precipitation February	Departure from Normal
		Inches	Inches	Inches	Inches
North Platte	Wyoming	4.08	-0.54	0.51	-0.64
South Platte	Colorado	3.12	-0.52	0.68	+ .04
Arkansas	Colorado	3.24	-1.52	0.71	-0.35

*Average Selected High Elevation Stations.

PLATTE-ARKANSAS RIVERS SNOW SURVEYS
March 1, 1951

Drainage Basin and Snow Course	Location							Snow Cover Measurements				
	No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches)			Past Record	
								1951	1950	1949	Yrs. of Rec.	Av. Water Content (Inches)
					MISSOURI RIVER							
CHEYENNE RIVER												
Upper Spearfish	1 S.Dak.	21	3N	1E	6500	2/26	9.6	2.3	2.8	9.4	7	5.5
Upper Castle	2 "	24	2N	1E	6800	2/26	14.8	3.6	4.2	9.7	7	5.3
Deerfield	3 "	23	1N	2E	6000	2/28	7.6	1.4	2.0	6.0	7	3.4
			Average for Drainage				10.7	2.4	3.0	8.4		4.7
					PLATTE RIVER							
SWEETWATER RIVER												
Grannier Meadows	29 Wyo.	19	30N	100W	9000	2/22	47.2	13.5	17.5	16.8	14	11.0
South Pass*	47 "	13	30N	101W	9000	2/22	44.9	13.5	17.3	15.8	11.	10.6
Larsen Creek	57 "	12	30N	103W	9000	2/25	49.7	15.7	17.3	13.1	2	--
			Average for Drainage				47.3	14.2	17.4	16.3		10.8
NO. PLATTE RIVER												
Cameron Pass	1 Colo.	2	6N	76W	10300	2/27	50.4	16.4	15.0	19.6	14	15.9
Park View	7 "	24	5N	78W	9200	3/1	30.1	6.3	7.8	11.8	15	7.6
Columbine Lodge	8 "	21	5N	82W	9300	2/26	73.9	25.8	15.1	19.8	15	17.7
Willow Cr.Pass*	62 "	1	4N	78W	9500	3/1	40.4	10.3	12.3	15.7	13	9.7
Northgate	136 "	8	1N	79W	8500	2/28	23.2	5.3	5.3	--	1	
Bottle Creek	7 Wyo.	24	14N	85W	8200	2/26	34.0	10.8	14.9	18.4	13	10.9
Webber Spring	8 "	27	14N	85W	9000	2/26	47.3	15.5	17.3	23.6	13	14.1
Old Battle	9 "	29	14N	85W	9800	2/26	74.5	25.7	30.5	36.1	14	25.4
N.French Creek	37 "	27	16N	80W	10200	2/25	69.6	25.9	21.3	28.7	13	22.8
N.Barrett Creek	38 "	30	16N	80W	9400	2/25	48.3	15.6	12.4	20.1	14	14.0
Ryan Park	39 "	34	16N	81W	8400	2/25	31.6	8.9	7.2	13.6	14	8.5
Spring Creek	67 "	32	15N	85W	9000	2/27	35.8	11.2	18.1	18.8	2	--
Albany	68 "	18	14N	78W	9400	3/2	50.9	15.7	9.9	15.4	2	--
La Bonte	69 "	11	27N	74W	8450	2/28	17.6	5.0	5.1	10.0	2	--
Boxelder	70 "	31	30N	75W	9000	2/26	14.4	2.3	2.7	--	1	--
Pearl	71 "	18	12N	82W	8900	3/3	18.9	5.0	--	--		
			Average for Drainage				50.0	16.1	15.4	20.7		14.7
CROW CREEK												
Pole Mtn. #2	34 Wyo.	35	15N	72W	8700	3/2	11.2	2.6	2.3	8.0	14	4.1

*On adjacent drainage

PLATTE-ARKANSAS RIVERS SNOW SURVEYS
March 1, 1951

Drainage Basin and Snow Course	Location					Snow Cover Measurement						
	No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	Water Content (Inches) 1951	1950	1949	Past Record Yrs. of Rec.	Av. Water Content (Inches)
PLATTE RIVER												
LARAMIE RIVER												
Deadman Hill*	50 Colo.	26	10N	75W	10200	2/27	45.8	13.2	11.7	16.7	14	10.7
Roach	88 "	5	10N	77W	9800	3/1	50.3	17.3	13.5	19.4	11	14.3
McIntyre	111 "	35	10N	76W	9100	3/1	37.0	10.7	7.9	12.4	2	—
Brooklyn Lake	3 Wyo.	11	16N	79W	10200	3/1	72.2	26.4	19.7	19.8	14	18.6
Fox Park	11 "	21	13N	78W	9200	3/2	30.3	8.0	3.1	7.1	14	5.7
Pole Mtn. #2*	34 "	35	15N	72W	8700	3/1	11.2	2.6	2.3	8.0	14	4.1
Libby Lodge	35 "	29	16N	78W	8700	3/1	41.1	13.4	9.6	12.3	13	7.5
Hairpin Turn	36 "	24	16N	79W	9500	3/1	46.2	15.2	10.7	13.1	13	8.4
Albany	68 "	18	14N	78W	9400	3/2	50.9	15.7	9.9	15.4	2	—
		Average for drainage					43.6	13.7	10.0	13.8		9.9
POUDRE RIVER												
Cameron Pass	1 Colo.	2	6N	76W	10300	2/27	50.4	16.4	15.0	19.6	14	15.9
Chambers Lake	2 "	6	7N	75W	9000	3/3	38.0	10.3	5.4	9.2	14	5.8
Big South	23 "	33	8N	75W	8600	3/3	14.9	3.1	2.0	2.9	13	2.0
Deadman Hill	50 "	26	10N	75W	10200	2/27	45.8	13.2	11.7	16.7	14	10.7
Lake Irene*	65 "	8	5N	75W	10600	2/26	70.4	25.3	17.0	26.1	13	16.6
Hour Glass Lake	68 "	18	7N	73W	9500	3/4	34.8	8.9	5.3	9.2	11	5.5
Red Feather	128 "	26	10N	74W	9000	2/6	23.9	6.8	6.2	10.9	2	—
		Average for drainage					42.4	12.9	9.4	14.0		9.4
BIG THOMPSON RIVER												
Lake Irene*	65 "	8	5N	75W	10600	2/26	70.4	25.3	17.0	26.1	13	16.6
Hidden Valley	95 "	23	5N	75W	9550	3/1	45.6	12.6	8.6	12.5	10	8.6
Deer Ridge	115 "	19	5N	73W	9050	3/1	27.2	7.4	4.0	8.0	2	—
		Average for drainage					58.0	19.0	12.8	19.3		12.6
ST. VRAIN RIVER												
Wild Basin	41 Colo.	24	3N	74W	10000	3/1	54.1	18.2	11.0	15.5	14	9.7
Copeland Lake	116 "	21	3N	73W	8600	2/28	24.2	7.5	3.6	5.8	2	—
Ward	134 "	1	1N	73W	9500	3/1	26.4	11.5	3.1	—	1	—
		Average for drainage					54.1	18.2	11.0	15.5		9.7

*On adjacent drainage

PLATTE-ARKANSAS RIVERS SNOW SURVEYS
March 1, 1951

Drainage Basin and Snow Course	Location					Snow Cover Measurements						
								Water Content (Inches)			Past Record	
	No. and State	Sec.	Twp.	Range	Elev.	Date of Survey	Snow Depth (Inches)	1951	1950	1949	Years of Record	Av. Water Content (Inches)
						PLATTE RIVER						
BOULDER CREEK												
E.Port.Moffat T.	5 Colo.	2	2S	74W	9400	2/27	21.8	6.0	5.3	2.3	14	3.3
University Camp	60 "	28	1N	73W	10300	2/26	72.6	26.2	8.6	20.2	13	15.4
Moffat	133 "	2	2S	74W	9400	2/27	40.9	15.4	6.1	--	1	--
		Average for drainage					47.2	16.1	6.9	11.2		9.4
CLEAR CREEK												
Loveland Pass	61 "	27	4S	76W	10600	2/28	55.2	17.7	7.9	11.6	14	9.8
Grizzly Peak*	97 "	2	5S	76W	11250	2/28	66.0	21.9	12.5	14.6	9	13.2
Empire	117 "	21	3S	75W	9650	3/2	35.7	9.0	4.6	3.4	2	--
Berthoud Falls	137 "	16	3S	75W	10500	3/2	47.3	13.4	--	--	--	--
Berthoud Summit	138 "	10	3N	75W	11300	3/2	62.3	14.8	--	--	--	--
		Average for drainage					60.6	19.8	10.2	13.1		11.5
SOUTH PLATTE RIVER												
Hoosier Pass	14 Colo.	13	8S	78W	11400	2/28	53.1	14.1	7.1	9.3	14	8.2
Fairplay	15 "	33	9S	77W	10000	3/1	9.9	1.8	1.0	2.2	13	0.9
Jefferson Cr.	83 "	14	7S	76W	10100	2/28	48.4	11.9	4.3	7.1	12	5.5
Geneva Park	118 "	18	6S	74W	9750	2/28	26.2	7.2	3.7	4.5	2	
Antero	120 "	1	13S	77W	9200	2/25	6.0	1.4	1.6	4.7	2	
Deer Creek	130 "	28	6S	78W	8950	2/28	8.3	2.0	0.3	1.6	2	
		Average for drainage					37.1	9.3	4.1	6.2		4.9
ARKANSAS RIVER												
Tennessee Pass	19 Colo.	21	8S	80W	10200	2/27	46.9	11.6	5.8	6.2	15	7.1
Twin Lakes T.	21 "	22	11S	82W	10500	2/27	41.4	13.3	8.0	9.2	13	8.3
Marshall Creek*	42 "	24	48N	6E	10800	3/3	47.4	11.9	7.5	13.5	15	9.8
Poncha Creek	43 "	19	48N	7E	10500	3/3	37.7	9.3	7.4	10.8	15	8.2
Whiskey Creek	72 "		37.2N	105.2W	10300	2/28	10.8	1.4	2.6	6.3	13	5.4
La Veta Pass*	74 "	22	28S	70W	9300	3/2	19.0	4.6	4.9	8.6	13	7.2
4-Mile Park	78 "	23	11S	81W	9700	2/27	25.5	6.3	2.4	2.4	12	2.8
Fremont Pass	79 "	2	8S	79W	11400	2/26	64.0	19.8	11.6	12.8	15	12.1
Monarch Pass	92 "	16	49N	6E	10500	2/25	57.3	16.5	11.1	15.9	9	13.1
St. Elmos	119 "	31	15S	80W	10600	2/27	39.2	9.1	10.2	10.9	3	
Timberline	121 "	8	9S	81W	11100	3/1	74.0	20.0	13.4	18.0	2	
Woods Lake	131 "	2	8S	83W	11000	3/1	45.8	11.6	18.5	--	1	
*On adjacent drainage			Average for drainage				38.9	10.5	6.6	8.7		8.2

Federal - State - Private

COOPERATIVE SNOW SURVEYS

Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

"WATER IS THE WEST'S GREATEST RESOURCE"